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United States Navy
MEDICAL NEWS LETTER

Vol. 37

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No. 12

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Closed Chest Cardiac Resuscitation

Henry T. Bahnson MD, Baltimore, Md. Editorial, Surg Gynec Obstet
112:622-623, May 1961.

The recent description by Kouwenhoven, Knickerbocker, and Jude of closed chest cardiac resuscitation marks an important contribution to the treatment of circulatory arrest. The work represents a happy union of chance observation and prepared mind. Kouwenhoven and Knickerbocker were seeking a means to keep animals alive long enough during ventricular fibrillation to test various methods of external electrical defibrillation. They discovered that pressure on the animal's chest with the heavy external electrodes gave an arterial pressure pulse and that rhythmic pressure resulted in maintenance of the peripheral circulation and prolongation of the viable period. Subsequent use of this method on patients by Jude showed that it was effective not only on children, as had been anticipated, but also on adults. In fact, in several documented instances, better circulation could be maintained in the closed chest than when it was open.

Effective closed chest cardiac resuscitation depends upon entrapment of the heart between the sternum in front and the vertebral column behind. The thoracic cage in unconscious and anesthetized patients may be surprisingly mobile. Thus, blood is forced out of the heart by pressure on the sternum, and the heart refills during relaxation. In practice, it is helpful to have the patient on a rigid support such as a stretcher, the floor, or a board placed under him if massage is to be given in a soft bed. The heel of one hand with the other on top of it is placed on the sternum just cephalad to the xiphoid. Firm, quick pressure is applied vertically downward about 60 times per minute, and at the end of each pressure stroke the hands are lifted to permit full expansion of the chest. The operator should be positioned directly over the patient in order to be most efficient in his efforts. If possible, someone should feel the femoral or other pulse, and if this is not forceful the location of the operator's hand or his manner of applying pressure should be altered. A quick, forceful pressure is important. Some pulmonary ventilation is provided by the closed chest massage, and if there is only one person present, attention should be concentrated on the massage. If there are more persons available, one should massage the heart while another ventilates the lungs by mouth-to-mouth or other available means.

Surgeons have been slow to accept the value of massage applied through the chest, being conditioned to the urgency of opening the thorax and massaging the heart within minutes of onset of circulatory arrest. When given a fair trial, however, external massage compares favorably with that given with the open chest. Either may be ineffective if the operator is not sensitive to the fact that small changes in the position and manner of pressure may make large differences in the peripheral pulse obtained. The pulse felt in the femoral, carotid, or brachial areas should be the guide to change in technic, and if this is satisfactory with external massage, the chest need not be opened. External massage is the method usually used at the Johns Hopkins Hospital in the treatment

of cardiac arrest and only rarely is the chest opened. The effectiveness of this method has been documented many times by direct measurement of arterial pressure and by survival of patients.

External cardiac resuscitation may be lifesaving in the patient who has circulatory arrest outside the hospital. A recent case documents this statement: The patient had been followed in the cardiac clinic because of myocardial infarction and associated electrocardiographic abnormalities. He and his family were aware of the threat of sudden death and so when he fell unconscious at dinner an ambulance was immediately called. The ambulance driver had, during the preceding week, attended a class given by Kouwenhoven on external massage and he performed this while his assistant used mouth-to-mouth ventilation until the patient could be transported to the ambulance and a respirator. External massage was continued in the ambulance and later, for 10 minutes, in the hospital where ventricular fibrillation was confirmed electrocardiographically and external defibrillation accomplished. The patient convalesced normally from a myocardial infarction which had apparently triggered the arrhythmia. The minimum time from apparent death to arrival in the hospital was 20 minutes. Open cardiac massage would have been virtually impossible under such circumstances.

The value of external massage lies in its simplicity. No ventilating equipment—other than mouth-to-mouth ventilation—intratracheal tube, or surgical instruments are needed. No incision is made and there is none to close, a valuable saving of time, discomfort, and life. More important, however, is the fact that since there is no disfigurement of the patient, or the surroundings, there should be less hesitation in starting massage, and the golden first few moments need not be spent in deliberation as to whether the effort should be made.

In some instances, the heart will be fibrillating, or if there is asystole it may begin to fibrillate after circulation is restored, and electrical defibrillation must be accomplished. An external defibrillator is then necessary, but just as when the chest is opened, circulation can be kept up while equipment is brought for external defibrillation.

Closed chest cardiac resuscitation will result in the saving of many lives.

* * * * *

Postoperative Use of d-Pantothenyl Alcohol

George L. Nardi MD and George D. Zuidema MD, Department of Surgery, Harvard Medical School, Boston, Mass. Surg Gynec Obstet 112:526-528, May 1961.

Recent reports have suggested that postoperative administration of d-pantothenyl alcohol is effective in preventing and treating enteric atony and ileus. The biochemical basis for using this agent rests upon the work of Lipmann and his associates who, in 1950, noted that pantothenic acid forms a part of

coenzyme A required for acetylation of choline to form acetylcholine, the latter being essential to both motor and secretory intestinal activity.

Lynch and associates have observed significant alterations of tissue pantothenic acid and coenzyme A levels after severe, prolonged, induced, or experimental stress in laboratory animals. More significant, however, is the observation that under the same conditions the intestinal acetylcholine levels were 50% higher at the end of the stress period in those animals which had been protected with d-pantothenyl alcohol throughout the course of the stress period. Bly and associates demonstrated a 50% loss of intestinal motility in pantothenic acid deficient dogs; others have observed similar effects.

Dextro pantothenyl alcohol has been administered to several groups of patients during the postoperative course; the findings have been strongly suggestive that this agent was effective in bringing about a more prompt restoration of normal gastrointestinal activity, and shortening of the convalescent period and hospital stay. Early resumption of normal peristalsis after operation not only would seem to be desirable in shortening the patient's discomfort and period of convalescence, but also might be of value in increasing resorption of intraperitoneal fibrin and reducing postoperative adhesions.

In a double blind study, 25 patients were given a placebo and 23 received d-pantothenyl alcohol; the average ages were 61 and 64 years, respectively. The average duration of the operation was 3.8 hours for the placebo group and 3.5 hours for the treated group. The average time required for passage of flatus following operation was 77 hours in the placebo group and 69 hours for those in the treated group. The average time for a bowel movement was 166 and 106 hours, respectively. The average hospital stay was 12 days in the treated group as compared to 14 days for the untreated patients. In the placebo group it was necessary to administer enemas to 6 of the 25 patients, whereas in the group given d-pantothenyl alcohol this procedure was necessary in 2 of the 23 patients.

At the conclusion of the study it was thought that 3 observed parameters lent themselves to statistical analysis: (1) hours required for passage of flatus; (2) hours required for passage of feces; and (3) duration of the postoperative hospital stay. The results indicated that the drug had a significant effect in all 3 of these parameters.

There was a distinct difference in grading the postoperative clinical course based on an over-all subjective evaluation by the resident and nursing staffs. Thirteen of 23 (57%) of the d-pantothenyl alcohol treated patients rated an excellent postoperative course as compared with only 8 of 25 (32%) with this rating in the placebo group.

There were no reactions or untoward effects attributable to administration of d-pantothenyl alcohol in this series of patients.

* * * * *

Nature herself must be our adviser; the path she chalks must be our walk.

—Harvey

Splenic Trauma

LCDR J. S. Maughon MC USN, CDR P. O. Geib MC USN, and CAPT H. F. Lenhardt MC USN, U. S. Naval Hospital, Portsmouth, Va. Splenic Trauma: An Increasing Problem. Surgery 49:477-485, April 1961.

Throughout the ages, the spleen has been associated with violence and trauma. During the past 50 years, with the environment increasingly conducive to both military and civilian trauma, splenic injury has continued to present a serious problem in surgical management.

Over the past 10 years, 90 splenectomies have been performed at this hospital. The leading indication was splenic trauma in 60% followed by primary medical disease in 31%. Splenic trauma has increased markedly in incidence during the 10-year period. The low ratio of one in 21,700 admissions in 1951 differs markedly from the high of one in 1762 admissions in 1959. The ratio of splenic trauma to general surgical admissions has increased over the past 5 years. The lowest rate recorded was in 1956 with one in 1139; the highest was in 1959 with one in 193.

Of 54 cases of splenic trauma, immediate rupture occurred in 38 with 6 deaths. Delayed traumatic rupture—rupture followed by complete or almost complete cessation of hemorrhage followed by renewed profuse secondary hemorrhage—was seen in 12 cases with one death.

Diagnostic accuracy leaves something to be desired. The largest number of patients with immediate rupture were admitted as "diagnosis undetermined" (ruptured spleen), with the correct diagnosis being apparent in 8%. A frequent association of injuries to the genitourinary tract is recorded as "diagnosis undetermined" (ruptured kidney, ruptured bladder, or hematuria).

The types of injuries can readily be applied to civilian as well as military patients. The majority resulted from motor vehicle accidents. In cases of delayed rupture, motor vehicle accidents accounted for 44%; in immediate rupture, 40%. A swollen, friable spleen incident to infectious mononucleosis is not an insignificant cause for splenic rupture. Minimal trauma in two instances were seen in the cases reviewed, and the literature reports many instances of spontaneous rupture or rupture following slight injury in patients in the active state of the disease. Vigorous palpation of the spleen in cases of infectious mononucleosis may change a medical curiosity into a surgical emergency.

Of the leading complaints and physical findings, it is significant that 100% of patients able to describe their symptoms in both the immediate and delayed rupture groups had persistent and usually progressive abdominal pain and discomfort.

On physical examination, 74% demonstrated generalized abdominal rigidity and tenderness, whereas 66% demonstrated rebound tenderness with referral to the left upper quadrant of the abdomen. In patients with delayed rupture, 41% complained of left shoulder pain, 25% of left lower chest pain and dyspnea as well as nausea and vomiting. Fifty percent had sudden discomfort

of a severe nature; 33% had fainting and weak spells, the majority for several days prior to admission.

Other diagnostic aids yielded few significant findings. Although x-ray studies are usually of little value, four significant signs have been described: (1) raised left hemidiaphragm, (2) displacement of the gastric shadow toward the midline, (3) subphrenic opacity, and (4) descent of the left part of the transverse colon. Laboratory studies (low or falling hemoglobin and hematocrit, leukocytosis, hematuria) were of more value than roentgenograms. Abdominal paracentesis has been found to be of little value as a diagnostic aid. False-negative taps encourage unwarranted delay; in cases of doubt, an exploratory incision is preferable to blind paracentesis.

The most common postoperative complication in patients with immediate splenic rupture was atelectasis of the left lung. Others included laceration of the tail of the pancreas, pneumonitis, and lower nephron nephrosis. Laceration of the tail of the pancreas, homologous serum jaundice, and urticaria secondary to blood transfusions occurred in 16% of patients with delayed rupture.

In 54 patients, there were 7 deaths (13%); 5 of the 52 who underwent operation died (10%). From 1956 through 1959, 26 patients underwent operation with no deaths.

Splenic trauma can cause death and complications with frightening ease. Splenectomy is a lifesaving operation when performed at the proper time. Truly, there is a golden period during which the diagnosis must be made and surgical treatment instituted to decrease the complications and possibility of death. Established clinical shock in splenic trauma increases morbidity and death; rapid and adequate treatment is mandatory.

* * * * *

Arteriosclerotic Heart Disease and Surgery

Marvin M. Nachlas MD, Samuel J. Abrams MD, and Mauricio M. Golberg MD, Departments of Surgery, Sinai Hospital of Baltimore, Inc., and the Johns Hopkins University School of Medicine, Baltimore Md. The Influence of Arteriosclerotic Heart Disease on Surgical Risk. Amer J Surg 101:447-455, April 1961.

Advance into old age generally carries with it a significant degree of coronary arteriosclerosis with or without clinical manifestations of cardiac impairment. Several studies have suggested that in patients with coronary artery disease the risk of surgery is only slightly greater than in the control group while other reports indicate that the hazard is materially increased by presence of coronary artery disease. One group of investigators believe that the cardiac patient who is carrying on his usual activities without symptoms should withstand operation as well as the individual with a normal heart. In contrast, another report emphasizes the point that the arteriosclerotic heart which is functioning adequately

may fail under the stress of surgery. The study reported here was undertaken because of the diverse opinions expressed in the literature and at medical conferences, and to obtain data which might be helpful in answering the recurring question of the advisability of performing elective surgery upon such cardiac patients.

Study was made of 165 patients with arteriosclerotic heart disease who underwent 200 major surgical procedures. Analysis was included of reports from several other clinics concerning the risk of surgery in the aged and in patients with arteriosclerotic heart disease. From these combined data the following statements appear justified:

1. Mortality and morbidity rates are two to three times greater among cardiac patients subjected to operation than among the total operated population.

2. The symptomatic manifestations of myocardial disease do not influence the mortality significantly, with the exception of congestive heart failure and recent infarction. Patients with angina pectoris, hypertension, or healed myocardial infarction are not greater surgical risks than are those in whom the diagnosis of arteriosclerotic heart disease is made without symptoms being present. Conversely, these findings emphasize the importance of handling the asymptomatic cardiac patient as carefully as one having symptoms when operation is being considered or undertaken.

3. The increased risk of surgery in the aged is due in large part, but not entirely, to the presence of arteriosclerotic heart disease. This statement is supported by the finding that, although mortality rates are significantly greater in patients over 70 years of age as compared with those of younger patients when age alone is considered, such age differences lose much of their statistical significance when all in the study group have heart disease. That other diseases—which are more likely to be present in older patients—also exert an influence is suggested by the observation that the mortality rate was greater for the aged group than for patients of all ages having arteriosclerotic heart disease.

4. Operative risk is not influenced by the choice of the anesthetic agent employed.

5. Although alterations in blood pressure during operation should be avoided if possible, occurrence of hypotension for short periods of time is not necessarily associated with catastrophic sequelae. Furthermore, stable blood pressure during operation does not eliminate the possibility of a myocardial infarction appearing in the postoperative period.

When arteriosclerotic heart disease is accompanied by a surgical lesion, what factors should influence the course of our action? First, the urgent nature of the surgical problem must be considered. There is no argument against immediate performance of lifesaving procedures, such as control of massive hemorrhage or the closure of a visceral perforation. However, there are a number of diseases about which opinions vary considerably as to the urgency of operative intervention. These include acute cholecystitis, certain sealed visceral perforations (some cases of peptic ulcer, appendicitis, and sigmoid diverticulitis), and nonstrangulating intestinal obstruction. While different

opinions may be justified with respect to management of these surgical lesions among the general hospital population, the argument for avoiding immediate operation among cardiac patients is supported by an abundance of reported data.

Before elective surgery is undertaken it is necessary to recall that, although most of the symptomatic manifestations of heart disease do not affect the surgical risk, there are two exceptions: the presence of congestive failure or a recent myocardial infarction. Treatment for cardiac decompensation can often bring the patient into the realm of relative safety for operation. Recognizing the existence of a recent coronary occlusion is of utmost importance because the mortality is high following any operation upon the patient who has sustained recent myocardial infarction. In contrast, elective surgery may be done without excessive danger if it is delayed from 4 to 6 months after the coronary artery occlusion. The other feature to be considered before recommending elective surgery is the gravity of the surgical lesion as compared with the cardiac status. In patients whose life expectancy is short because of advanced myocardial disease, elective operations are certainly contraindicated, and one might even question the advisability of doing radical surgery for anticipated long term cure of a malignancy. On the other hand, if one anticipates that the patient might live for a number of years despite his injured myocardium, malignant processes should be extirpated. Benign lesions must be evaluated as to the likelihood of their precipitating a more serious challenge to the patient's health at a later time when they might require an emergency operation.

* * * * *

Barbiturate Poisoning

Carl Clemmesen, Psychiatric Department, Bispebjergs Hospital, Copenhagen, Denmark; and Eric Nilsson, University Hospital, Lund, Sweden. Therapeutic Trends in the Treatment of Barbiturate Poisoning: The Scandinavian Method. Clin Pharmacol Ther 2:220-229, March - April 1961.

Barbiturate poisoning and its treatment have been in the limelight in the last 15 years, mainly because of the enormous increase in such cases after World War II. This increase has been many fold both in Sweden and Denmark and involves not only the number of cases, but often also their severity; that is to say, the doses taken in some cases have been enormous. Whether this signifies more determined suicidal attempts or a reaction to the publicly known increasing efficacy of treatment is difficult to elucidate.

Intoxication with hypnotic drugs is a modern medical problem, interesting and serious, and one to which both the community and the physician should be constantly alert. Mortality rates reported from various parts of the world fluctuate considerably from 8% (1500 deaths) in the United States to 1 to 2% (20 to 30 deaths) at a Copenhagen center. A survey of the causes of death, however, gives pointers to possible therapeutic measures for the future which may enable even more of these patients to be saved, but these must depend on

expansion and intensification of research. The lethal complications could perhaps be treated earlier, and connection between the circulation, renal function, and central depression could be further illuminated. Definition of the function of the adrenal cortical hormones may perhaps provide the means with which to diminish the effects of the stress factor and the risk of falling blood pressure with its consequent renal damage, and to increase the patient's ability to withstand anoxia. Earlier and better treatment of acidosis may be yet another means of reducing the mortality figures.

Up to the middle 1940s, the basis of treatment was massive gastric lavage, often with suspensions of powdered carbon together with intensive use of "central analeptics." Results of this treatment showed no improvement over those during the previous 20 years, however, and the central analeptics did not fulfill the promise indicated by animal experiments. Gastric lavage was shown to be not entirely without risk and its therapeutic value was doubtful. Carbon was shown to be ineffective because of the cessation of intestinal peristalsis after large doses of barbiturates; therefore, the carbon suspension failed to reach the intestine.

Intensive central stimulation therapy used during this era did not reduce the mortality below 20%. Furthermore, this therapy gave rise to situations in which it was difficult to estimate the patient's condition. One saw a mixture of symptoms which were partly a result of the poison, partly a sequela of the comatose condition, and partly—one suspected—a result of the stimulating drug.

In 1946, Kirkegaard showed that one of the most important pathophysiologic factors was peripheral circulatory collapse—shock. The therapeutically important result of his work was introduction of effective measures to combat shock, and from that time onward, the mortality rate began to fall. When the further significance of a free and continuously patent airway together with prevention of long periods of hypoxia was pointed out by Nilsson in 1951, the way was opened for a more effective approach to the treatment problem. By eliminating central analeptics from the treatment and rigidly observing physiologic principles in therapy, antishock measures, a free airway, and possible use of oxygen, the mortality rate was brought down. Through the years, this form of treatment has fulfilled its early promise. Certain adjustments have been made after the appearance of new types of complication, problems one did not see previously since the death of the patient usually forestalled their development.

This type of treatment has been referred to in the literature as "Scandinavian therapy." Our regimen which is carried out day after day until the unconscious patient is out of danger requires intensive organization of both treatment and staff, closely comparable with the activities of the "intensive therapy" units which are now being developed in most modern hospitals.

Clinical Evaluation

Clemmesen has described the following three stages or phases through which poisoned patients may pass after taking large doses of hypnotics.

Induction Phase. This is characterized by a state of physiologic imbalance brought about by the poison. Treatment must be started at once and should be directed toward prevention of lethal complications. If too much time is taken to correct the shock or to secure the requirements for normal respiration adequate to maintain O_2 and CO_2 at normal blood tensions, the patient can be lost before the real battle has started.

Second Phase. The patient lies in a stabilized state of coma and in approximate physiologic balance. His condition must be carefully checked at hourly intervals, and he must be under continuous observation day and night. The coma may last a considerable time. Reawakening tends to occur in waves rather than uniformly. In our experience, the longest coma to be followed by complete recovery has been 12 days.

Third Phase—Reawakening. The patient begins to react more and more to certain stimuli. He coughs during tracheobronchial evacuation. The pharyngeal reflex returns, and he begins to make more or less coordinated movements and is sometimes very restless. He may even be quite unruly. When the pharyngeal reflex has returned satisfactorily, the patient may be allowed to begin to take fluids by mouth, but he should not be regarded as awake until he can reply to a question with an adequately articulated word. Despite his improved condition, the patient is not entirely out of danger and should be watched carefully during the subsequent days. The patient is still very weak and fatal complications can still develop. As a rough and ready rule, we estimate that after regaining consciousness, the patient should be closely observed for that number of 4-hour periods corresponding to the duration of his coma in days.

Scandinavian Routine in Detail

Therapeutic measures should be judged and evaluated primarily with regard to those complications which can occur and threaten life in association with barbiturate poisoning. Admittedly, the poison itself may be the direct cause of death, but more usually it is the result of secondary complications. Our treatment is therefore aimed at securing as rapid a breakdown and removal of the barbiturate as possible, together with prevention and treatment of complications. Because pulmonary and cardiac complications accounted for 33% each of the deaths in Copenhagen, and renal damage and irreversible shock were each responsible for 17%, the circulation, respiration and airway, and renal function have become the foci of attention. It is toward maintenance of normal physiologic conditions in these areas that our efforts have been directed.

Cardiovascular System. An overdose of barbiturate can lead to a primary fall in blood pressure which is a feature of the poison's effect on the vasomotor center. Later comes a secondary fall—the result of the barbiturate's effect on the vascular bed of the myocardium. The patient thus develops a typical shock syndrome. Treatment is started at once. Dextran is given intravenously; when frank shock is present, 2 to 3 L of blood, dextran, and plasma may be needed to check it. Active treatment must not be discontinued until the patient is out of shock phase.

Corticosteroids and the Circulation. In barbiturate poisoning, the patient is severely stressed partly by the poisoning as such and partly by the secondary shock, both factors being of special importance in this respect. Despite lack of evidence that corticosteroids effectively contribute to treatment of barbiturate intoxication, when severe shock is present, intravenous preparations of the steroids may be tried daily during the first few critical days to support the otherwise standard shock therapy.

Respiration and the Airway. Pulmonary and respiratory complications have always caused large numbers of deaths with barbiturate poisoning. Previously it was usually pneumonia, but recently it has been central respiratory depression which has been the predominant factor. A rise in temperature and suspicion of pneumonia indicate prophylactic penicillin in doses of 2 to 5 million units twice a day. The management of the unconscious patient's airway must be such that it is kept free and patent during all phases and in all situations, so that there is adequate ventilation, i. e., adequate oxygenation and removal of carbon dioxide.

The patient is turned from one side to the other at 2-hour intervals day and night. Routine daily chest x-rays forestall atelectasis. If it develops, it is treated along anesthesiologic principles with tracheobronchial clearing and, if necessary, by bronchoscopy. Oxygen is given from time to time via a nasal catheter, or by catheter through a pharyngeal airway. If difficulty is experienced in keeping the bronchi free of secretion by ordinary means or if the secretions become excessive, an endotracheal tube is passed and left in situ. The period of intubation should not exceed 4 days, however; if a longer period is anticipated one should resort to tracheostomy.

The most serious respiratory problem is central respiratory depression. Always the question has been asked: "Cannot a stimulating drug be used to reverse this central depression and thus support respiration?" Despite the assertion from many quarters that the "central analeptics" are capable of doing this, they have never succeeded in doing so at the Copenhagen center. The only cases in which one saw any effect from convulsive analeptics such as pentylenetetrazol and picrotoxin were those in which such stimulation was not in fact needed. In the really severe cases no benefit has been observed.

Place of Bemegride. Bemegride was introduced as a real antidote to the barbiturates and early publications were encouraging. Stimulation of respiration is achieved; however, its properties do not lie in a purely pharmacologic antagonism to barbiturates since the effects of the latter persist. As a central analeptic—which bemegride must be regarded—it is superior to earlier preparations in that it does not cause hypertension and overtaking of the already intoxicated myocardium, neither does it cause hyperpyrexia. Occasional use of bemegride in patients does not, however, justify neglecting the antishock regimen which remains the most vital factor in bringing about as normal a physiologic condition as possible during the coma period.

Artificial Ventilation. Another approach to treatment if apnea or respiratory insufficiency supervenes is to institute artificial respiration. Without doubt, the best way of doing this is to use a mechanical ventilator. The

indications for beginning artificial ventilation and the estimations of its effectiveness are critical for homeostasis. Respiratory acidosis can develop insidiously; the only sure means of diagnosis is serial blood gas analysis. The usual delay in obtaining results of these determinations may complicate management.

During recent years, Astrup and colleagues (Lancet 1:1035, 1960) have evolved a new approach to estimation of acid-base equivalence. From a pH determination and a nomogram which includes a base-excess (or base deficit) curve, they were able to make important deductions. If the pH is known, $p\text{CO}_2$ and base-excess or base-deficit expressed as meq/L of blood can be easily calculated from the curve in the nomogram. A direct answer is always obtained on the important features such as pH, $p\text{CO}_2$, and the acidotic or alkalotic tendencies in the blood. That the answer is given rapidly means that the method could be put to good use in all situations involving artificial ventilation of patients.

Renal Complications. Kidney failure is a most serious complication, since elimination of barbiturate is dependent on its excretion by this organ. In order to elucidate the risk of anuria and the patient's prognosis, creatinine clearance may be followed. In one series of 51 patients, creatinine clearance was done daily for the first 4 days after admission. The lowest 24-hour figure observed during these 4 days was made the basis for prognostic purposes. It could then be predicted that if in a given patient this value remained over 40 ml, survival was likely. Those with a value of 10 ml or below developed uremia and, of these, 50% died. The value of this examination in severe cases has been established and has continued in routine use.

In attempting to avoid such complications, irreversible shock and hypotonia together with prolonged hypoxia are prevented as much as possible. If the shock has not abated after 1000 ml dextran, plasma, or blood, arterenol is added to the infusion to maintain blood pressure and renal perfusion pressure. Despite this treatment, some patients still become anuric; these require dialysis. Dialysis has also been discussed as a potentially routine method of securing rapid elimination of barbiturates from the body. However, in view of the good results we have obtained with our present methods, this innovation does not seem justified.

Alkalinization and Forced Diuresis. Waddel and Butler showed that increased diuresis could be obtained by pushing the pH of the blood toward alkalinity. Also it was shown that alkalinization of the blood brought about a rise in blood barbiturate levels, signifying mobilization and transfer of the drug from cell to plasma. Alkalinization was brought about by the daily administration of from 3 to 4 L of bicarbonate solution. The relatively large amounts of fluid used, together with increased pH, thus brought about a free diuresis and aided elimination of the poison. Use of this technic gave satisfactory results.

At the Copenhagen center, this method was employed during 1960 with the addition of a diuretic to increase diuresis still further. By comparing these cases with others not so treated yet equally severe, or by occasionally using cases as their own control, it was concluded that this regimen reduced the length of coma by approximately 50%. It is doubtful, however, whether this method should be adopted routinely in all cases of barbiturate poisoning.

Straight Back Syndrome

Maurice S. Rawlings MD, Diagnostic Center, Chattanooga, Tenn. Straight Back Syndrome: A New Heart Disease. Dis Chest 39:435-443, April 1961.

The "straight back" syndrome is a heretofore unrecognized deformity of the chest causing pseudo-heart disease. We have so named it since the condition seems to represent a congenital loss of the normal kyphotic curve of the upper dorsal spine. The flattened palm of the examiner's hand may be superimposed upon the area without deviation of the examiner's fingers. Instead of the deformity affecting the sternum as in "funnel chest," there is an incomplete inward displacement or flattening of the upper dorsal spine.

This syndrome may produce pseudo-heart disease in one or two ways. First, as in funnelling of the sternum, there is decrease in the antero-posterior diameter of the chest which is most noticeable in the area of the upper dorsal spine. On x-ray examination, false heart enlargement results in the front view, particularly in the great vessel area and waist of the heart since these structures are compressed between the sternum anteriorly and the straightened, somewhat inwardly displaced dorsal spine, posteriorly. Secondly, pseudo-heart disease may be produced by torsion or kinking of the great vessels. This seems to produce mechanical murmurs in systole located near the base of the heart or over the precordium. Both types of pseudo-heart disease appear to be completely benign in nature and congenital in origin. Rarely is the defect found without either false heart enlargement or mechanical heart murmurs.

Clinical Cases

During a period of 4 years in a moderate-size city, we have gathered 12 cases of straight back syndrome which had been masquerading as heart disease. It has yet to be determined what the incidence would be in the general population.

The degree of deformity found in this syndrome varied from mild cases with torsion murmur and no enlargement to severe cases with actual widening of the heart shadow. The less severe cases were more frequent and usually presented slight, harsh, late systolic murmurs over the base of the heart. There was also an increased pulmonic closure sound in most cases and x-ray films usually showed a "filling" of the waist of the heart. This filling fluoroscopically represented rotation and impingement of the pulmonary conus against the retrosternum in the area of the murmurs. The dorsal spine was straightened and seemed to be a constant clinical finding in these cases. Actual physical grooving or funnelling of the spine rarely occurred.

Discussion

Differentiation of true and false heart enlargement in routine chest x-ray films is best made by obtaining a lateral view of the chest to demonstrate heart compression or "pan-caking" induced by the narrowed antero-posterior diameter of

the chest. Normally, the degree of impingement upon the retrosternal space varies with the shape of the thorax, the degree of inspiration (when it is closer to the sternum), and the amount of pericardial fat or obesity. To be included in this list now will be the "Straight Back Syndrome" in which the retrosternal space is usually obliterated.

Often the degree of straight back deformity is insufficient to produce heart shadow enlargement, but is sufficient to compress the aortic arch or impinge upon the main pulmonary trunk to create mechanical murmurs. The pulmonary conus lies against the inner surface of the sternum in most of these cases, and perhaps could transmit sounds more readily for this reason. The aorta, anchored at the root of the heart and at the diaphragm, is subject to torsions at the level of its arch which could conceivably create murmurs. Moreover, the straight back syndrome tends to feature an aorta that descends completely anterior to the dorsal spine, appearing to be a more midline structure than usual. The exact etiologic mechanism of the murmur found in this syndrome, however, is not clear.

Perhaps the defect might begin in the eighth week of fetal life before ossification occurs in the bodies of the vertebrae. Perhaps the failure of development of the normal dorsal kyphosis could be a common occurrence when compared with the multiplicity of many other spinal defects that frequently appear. Perhaps the completely straightened spine that characterizes the normal infant fails to develop the expected postural curves of adulthood for other reasons. It is conceivable that the degree of deformity could also be limited by the thoracic cage itself due to the splinting effect of the ribs upon movements in the dorsal spine. Nevertheless, helping to confirm the developmental origin of the straight back syndrome, is one case we found in which there was an associated mild funnel chest deformity.

Many other factors could also have influence upon the development of the apparent enlargement of the heart. Perhaps there is an associated persistence of the globular heart of the infant into the adult silhouette. Perhaps also, the depth of the chest fails to increase as the body in general continues to grow. Another possibility is the resemblance of the heart silhouette found in recumbency to that found in the straight back syndrome. During recumbency, the cardiac silhouette widens considerably as gravitational effects cause the heart and great vessels to rest toward the dorsal spine posteriorly. Perhaps this is why most functional murmurs seem to increase during recumbency. This is still a matter of conjecture and needs a means of objective evaluation.

Although it is known that cardiorespiratory failure may result from various chest deformities causing distortion of the heart or kinking of the great vessels, we have not observed any tendency to decompensation with this new syndrome. Perhaps this can be likened to the rarity of heart failure in pectus excavatum compared to its relative frequency in kyphoscoliosis.

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The most difficult of all, to keep quiet and listen. —Aulus Gellius

Sinus Trouble: Fact or Fancy?

Harvey C. Gunderson MD, Mercy Hospital, Toledo, Ohio. GP23: 93-97, April 1961.

If we accept the self-made diagnosis of "sinus trouble" with which many patients come to us, then this affliction is one of the most common to beset mankind. However, as practitioners of the science and art of medicine, we are obliged to make a scientific diagnosis before beginning treatment of a patient's disorder. In my experience, patients commonly misdirect their attention to their sinuses when suffering from symptoms referable to the upper respiratory tract or sinus areas, and it is unfortunately true that physicians sometimes share this mistake with their patients. Occasionally, one is tempted to conclude that a physician has wrongfully blamed sinuses as the cause of symptoms which he has been unable to explain satisfactorily to the patient. Yet, many symptoms attributed to sinus trouble are, in fact, due to other causes; and conversely, disorders of the sinuses sometimes bring about symptoms wrongly attributed to other pathologic changes.

Cause of Symptoms

The nasal passages serve many functions; it is disturbance of these functions which causes many of the symptoms commonly attributed to sinus trouble. Let us consider factors interfering with good function and thereby giving rise to symptoms attributed to sinus trouble. As an aid to the memory, it is useful to remember the vowels of the alphabet.

Allergy. A stands for allergy which can cause a multiplicity of complaints referable to the upper respiratory tract and adjacent areas to account for the symptoms called "sinus trouble." In fact, the allergic swelling in the mucosa of the sinuses can cause distressing pain in and around the eyes on a truly allergic basis.

Endocrine Imbalance. E stands for endocrine imbalance which in my experience has been principally hypothyroidism. Proper treatment of the patient's hypothyroidism is very important for real relief of his so-called "sinus" symptoms. An endocrine factor is also at work during pregnancy and some expectant mothers have a distressing time with nasal obstruction and headaches until a week or two after the baby's birth.

Inflammation. I stands for inflammation; but it includes not only the acute and chronic infections of the nasal chambers and accessory sinuses, but also inflammation due to other means, principally smoking. Smoking is more commonly a cause of so-called "sinus" symptoms than people realize.

Obstructions. O stands for obstructions; these are commonly associated with anatomic deformities of the nasal septum. However, associated external deformities occur and must be treated along with the condition of the septum for best results.

Psychologic Factor. U stands for You, the individual, as an emotional being. Many symptoms attributed to sinus trouble are associated with factors

for which no organic cause can be found and, therefore, one is tempted to believe that they are on a psychologic or emotional basis. To be complete in our alphabetical review, let us include the letter Y which stands for wild tumors, fortunately not common.

Evaluation of Symptoms

How do we evaluate all of these factors which can contribute to the symptoms of which the patient complains?

History. Securing a good history is important. Here are some points advisable to cover: Are the complaints constant or intermittent, sudden or insidious, responsive to treatment or not, associated with symptoms referable to other parts of the body? If there are pains and aches, where are they located? Does position, sleep, weather, season, or work affect complaints? How much sleep is required? What are the sleeping habits? Smoking habits? Habits of alcohol consumption? Dietary habits? Changes noted in skin, hair, nails, weight? Changes in the menses? Symptoms worse on one side? Areas of tenderness ever noted? Sore throats? Sore throats worse on one side? Throat feels dry? How many handkerchiefs used per day? What about discharge on blowing the nose? Are there allergies in the family? Other lines of inquiry suggest themselves in each case.

Physical Examination. An appraisal of the patient's over-all attitude and bearing is worthwhile. Temperature and blood pressure recordings should not be neglected. To examine the eye grounds with an ophthalmoscope is sometimes very informative. Inspection and palpation of not only the nose and adjacent structures but of the entire head is in order. Anterior rhinoscopy before and after the use of shrinking medication is in order as well as use of a posterior nasal mirror used through the mouth, and use of a nasopharyngoscope. Transillumination of the sinuses is sometimes very helpful, also smears and cultures of nasal secretions. Routine x-ray studies as well as body section roentgenograms or x-rays with contrast media in the sinuses are often valuable. However, a negative x-ray does not exclude nasal or sinus disorders. As a last step under diagnostic aids, let me mention exploratory surgery. This is a relatively harmless procedure invaluable in assessing what looks like a tumor in the sinus.

Seeing a patient with symptoms attributable to sinusitis, we must use all possible diagnostic means. He may have hypertension, migraine, allergy, glaucoma, an abscessed tooth, a polyp in a sinus, septal deviation, or even a sinus infection. He may smoke or drink too much, she may have premenstrual tension, or both may have a daughter married to a bounder. And, let us not forget the patient who has a brain tumor.

Misconceptions Regarding Sinus Trouble

Nose drops are only rarely beneficial. Many believe they can perpetuate nasal obstruction. There is no doubt that climate has an influence. Chronic nasal

obstruction does not spell sinus disease, it may be due to many causes. Alternating nasal obstruction is not abnormal, it is physiologic.

Once a sinus has been punctured, it does not have to be done repeatedly throughout the rest of the patient's life. Once a patient has an operation on his nose, the nose is not ruined. Modern methods of treatment and surgical techniques promise much better results than those of a decade ago. However, the incidence of sinus operations is certainly less now than it was 10 years ago.

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MISCELLANY

Training in Civilian Institutions

In view of the need for early commitment with civilian institutions for training programs to begin in the summer and fall of 1962, interested medical officers are urged to submit their request to the Chief, Bureau of Medicine and Surgery, prior to 31 August 1961. The types of training programs available are:

1. Thoracic Surgery—certification by the American Board of Surgery required.

2. Plastic Surgery—completion of 4 years of General Surgery required by the Bureau of Medicine and Surgery

3. Public Health—leads to Masters degree in Public Health and certification by American Board of Preventive Medicine in Public Health.

4. Occupational Medicine—leads to Masters degree in Public Health (in Industrial Health) and certification by the American Board of Preventive Medicine in Occupational Medicine.

5. Aviation Medicine—leads to Masters degree in Public Health and

certification by the American Board of Preventive Medicine in Aviation Medicine.

6. Neurology—three-year program in civilian institution.

7. Radiobiology—academic year at the University of Rochester followed by field trips to reactor sites.

8. Subspecialties of Internal Medicine (Allergy, Gastroenterology, Hematology and Pulmonary Diseases)—completion of three years in Internal Medicine.

Officers may indicate three choices of institutions in order of preference where they desire the training or may request training in a civilian institution to be determined. However, the Bureau will make final arrangements for enrollment, after approval of the request has been obtained.

Applicants may contact institutions relative to training, but in any correspondence or interviews, it should be made clear that any acceptance would be contingent upon approval being obtained from the Bureau of Medicine and Surgery.

Applications from career medical

officers qualified to enter these programs should be made by official letter to Chief, BUMED, via chain of command, in accordance with BUMED INSTRUCTION 1520.10A. Only a limited number of individuals will be sponsored in these programs in view of the existent personnel shortage.

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Sanitary Science Course

Medical Service Warrant (8171, 8172) and Medical Service Corps (2301, 2302) officers are invited to submit applications for the 5-month Sanitary Science Course conducted at the University of California, Berkeley, Calif., beginning in January 1962. Applications are particularly desired from officers with less than 16 years of total active service and who will have completed at least 12 months in their present assignment by 1 January 1962.

The objective of this special course in Sanitary Science for military personnel is to qualify officers to serve in sanitation billets. The curriculum includes courses in environmental sanitation, advanced problems in sanitation, sanitary microbiology of foods and beverages, introduction to occupational health and industrial hygiene, and control of communicable diseases.

Applications shall be submitted to the Chief, Bureau of Medicine and Surgery (Code 3161), via the commanding officer, to be received by 1 August 1961. Application procedures are set forth in paragraph 8 of BUMED INSTRUCTIONS 1520.12A and 1500.7; cost estimates need not be submitted.

* * *

Armed Forces Seminar in Obstetrics and Gynecology

The Air Force Medical Service will act as host for the Tenth Annual Armed Forces Seminar in Obstetrics and Gynecology, to be held at the U.S. Air Force Hospital Lackland, Lackland Air Force Base, Texas, 16 through 19 October 1961.

This seminar is primarily directed to furthering the high standards of obstetrics and gynecology as practiced within the military service. All Obstetricians and residents in Obstetrics and Gynecology on active duty are eligible to attend.

In view of the anticipated shortage of travel funds for fiscal year 1962 only a limited number of officers can be authorized to attend the seminar on travel and per diem orders chargeable against Bureau of Medicine and Surgery funds. Eligible and interested officers who cannot be provided with travel orders to attend at Navy expense may be issued Authorization Orders by their Commanding Officers following confirmation by this Bureau that space is available in each case. Requests should be forwarded in accordance with BUMED INSTRUCTION 1520.8 at least 8 weeks prior to commencement of the seminar.

* * *

Army Postgraduate Short Courses

The following postgraduate professional short courses will be conducted by the Army Medical Service during the first part of fiscal year 1962; courses offered during February through May 1962 will be listed in the News Letter

during the fall. Eligible Medical Corps officers are those who meet the criteria prescribed by BUMED INSTRUCTION 1520.8. Eligible Medical Service Corps officers are those who are currently assigned to billets with a direct relationship to the courses as listed.

In view of the anticipated shortage of travel funds for FY 1962, only a limited number of officers can be authorized to attend these courses on travel and per diem orders chargeable against Bureau of Medicine and Surgery funds. Eligible and interested officers who cannot be provided with travel orders to attend at Navy expense may be issued Authorization Orders by their commanding officers following confirmation by this Bureau that space is available in each case. Requests should be forwarded in accordance with BUMED INSTRUCTIONS 1520.8 and 1520.12A, as appropriate, at least 8 weeks prior to commencement of the requested course.

(WRAIR—Walter Reed Army Institute of Research, Walter Reed Army Medical Center; AFIP—Armed Forces Institute of Pathology; BAMC—Brooks Army Medical Center)

1. Fundamentals of Medical Support in Future Warfare (All Corps), WRAIR, 9-20 October 1961.

2. Application of Histochemistry to Pathology (MC, MSC), AFIP, 16-20 October 1961.

3. Introduction to Research Methods (MC), AFIP, 23-27 October 1961.

4. James C. Kimbrough Urological Seminar (MC), BAMC, 6-8 November 1961.

5. Environmental Health Engineering in the Mid-Range Time Frame (MSC), WRAIR, 8-12 January 1962.

6. Forensic Pathology (MC), AFIP, 15-19 January 1962.

7. Medical Nursing (NC), WRAIR, 29 January - 2 February 1962.

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BUMED NOTICE 6710 2 June 1961

Subj: FSN 6505-153-8278 Globulin,
 Immune, Serum USP (Human)
 10 cc

Numerous inquiries have been received by the Bureau regarding the feasibility of utilizing subject item as a prophylaxis against infectious hepatitis. As outlined in the BuMed Publication, Technical Information Manual for Medical Corps Officers, Chapter 15, (Immunization, NAVMED P-5052-15), subject item is intended for use as an immuno-therapeutic agent for many uses, such as: (a) prevention and modification of measles; (b) prophylaxis against infectious hepatitis; (c) limited use in certain specific situations in preventing poliomyelitis. This directive authorizes disregarding that portion of the package insert for subject item which indicates use for "modification of measles," only.

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Inspector General's Reports

During inspection trips the Inspector General, Medical, becomes aware of areas of general concern about which amplification is warranted. Recently, attention has been paid particularly to General Order 21, Naval Leadership. A few of the questions considered by the Inspector Generals in

evaluating implementation of General Order 21 are presented. It is hoped that these will be helpful to all concerned.

1. Is every member of the command familiar with General Order 21?

2. Does the command have an instruction implementing General Order 21?

3. If so, is the instruction signed by the current Commanding Officer?

4. Is the Executive Officer Chair-

man of the Naval Leadership Committee?

5. Is an officer of the Chaplain Corps a member of the Leadership Committee?

6. Does the command have a formal leadership program for officers and civilian employees, as well as for enlisted personnel?

7. Does the command have an approved program in writing implementing various facets of General Order 21?

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American Board Certifications— Active Duty

American Board of Obstetrics and Gynecology

CDR Charles M. Garland Jr
LCDR Paul P. Steckler (USNR)

American Board of Pathology

LT George J. Kandzie (USNR)

American Board of Pathology in Clinical Pathology

LCDR T. C. Hartney

American Board of Pediatrics

CDR Leslie W. Sederstrom

American Board of Radiology
LT John B. McCoy (USNR)

American Board of Surgery

LCDR George M. Kroncke (USNR)
LCDR Don L. McCord

American Board of Thoracic Surgery

CAPT Felix P. Ballenger
CAPT S. Ede
LCDR Donald H. Gaylor

American Board of Urology

CAPT William E. Fraser

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Technic for Training in the Art of Suturing

LT H. S. Sturim MC USNR, USS INDEPENDENCE (CVA-62), c/o Fleet Post Office, New York, N. Y.

On many occasions—aboard ship and in the field—hospital corpsmen are faced with the problem of suturing lacerations without the aid or supervision of a physician. This article re-

lates how the problem was handled aboard the USS INDEPENDENCE, and proposes a simple way of teaching large numbers of inexperienced personnel in a short time how to suture

lacerations and handle surgical instruments.

Classes were divided into groups of 12 or more men, with one Medical officer teaching the class, assisted by

two or three experienced corpsmen. A laceration in each corpsman's "patient" was made by the instructor. With each experienced corpsman taking charge of three or four men, every student was



two or three experienced corpsmen. After a basic orientation talk on the different types of suture material, needles used in different situations, and basic instruments, the physician demonstrated use of the instruments, free hand ties, and the technic of placing simple and vertical mattress sutures. The subject was a quarter of a raw chicken in which an incision had been made to simulate a laceration.

Each student was then issued a pair of needleholders, forceps, scissors, and needles with 3-0 and 4-0 silk pro-

vided in cut lengths. A laceration in each corpsman's "patient" was made by the instructor. With each experienced corpsman taking charge of three or four men, every student was

able to place one or two dozen sutures under direct supervision. The Medical officer was able to inspect up and down the line of suturing students and help with advice where needed.

Because the only factors limiting the number of students that could be taught to effectually suture by these methods were the number of experienced corpsmen available and the size of the room used for the class, this method was found practical for very large groups.

Chicken quarters provide the ideal

media for practice because they are economical, have a skin layer which gives the student the feel of suturing different layers, and are easily obtained.

By using these methods we found that large numbers of inexperienced men could gain experience in the methods of suturing without subjecting human patients to their first attempt.

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From the Note Book

Admiral Kenney Addresses Graduates. Rear Admiral Edward C. Kenney, Surgeon General of the Navy, addressed the graduating class of St. Louis University, St. Louis, Mo., on 3 June 1961. The present class was the 143rd graduating class since the University was founded in 1818.

NAMRU-2 Team in Penghu. Eleven Chinese and American staff members from Naval Medical Research Unit No. 2 at Taipei, formed a team for 2 weeks' intensive field research in the Penghu Islands. The team collected hundreds of biologic specimens, many of which are believed to be firsts from this geographic area, including rare poisonous sea snakes, whose venom will be studied. After varied studies have been completed in the Taipei laboratories, the specimens will be deposited in museums on Taiwan and in the U.S. The research team also examined hundreds of birds, rodents, reptiles, and fish for parasites during their travels by jeep, fishing boat, and on foot among the inhabited and uninhabited islands of the Penghu group. During the 2-week trip approximately 1000 school children were also examined. Success of these field studies was due in large measure to the full support provided by the Chinese military and public health officials in the Penghu Islands.

USNH Jacksonville Host to Medical Society. The U. S. Naval Hospital, Jacksonville, Fla., was host to the Duval County Medical Society at their meeting in May; all military medical officers in the Jacksonville area were invited. Approximately 125 physicians in the hospital auditorium heard the professional portion of the meeting consisting of two papers: Prediabetes and Pregnancy—CAPT R. K. Brooks, LT A. H. Carmichael, and LT C. J. Freund; and The Effect of Physical Exercise on Serum Transaminase—CAPT H. A. Schlang.

USNH Bremerton Holds Symposium. A symposium on Peptic Ulcer was recently presented at the U. S. Naval Hospital, Bremerton, Wash., by a panel of physicians from the Mason Clinic, Seattle, Wash. Joel Baker MD, Chief of Surgery, Virginia Mason Hospital, and Chairman of the Mason Clinic was moderator. To consolidate mutual interest and establish an active rapport with other physicians in the area, invitations were extended to civilian and other military physicians and their wives. (TIO, BuMed)

USNH Memphis Sponsors Meeting. The U. S. Naval Hospital, Memphis, Tenn., recently sponsored the annual joint meeting of the staffs of the Hospital and the Dispensary, Memphis

Naval Air Station with the Memphis-Shelby County Medical Society. Following the dinner attended by more than 140 prominent civilian physicians and surgeons, CAPT F.J. Weddell Jr, MC USN, Commanding Officer of the Hospital, presided over the professional meeting. CAPT R.B. Jamieson Jr, MC USN, read a paper—Navy Medicine and Project Mercury—prepared by LCDR J.S. Maughon MC USN; and CDR J.C. Novak USN, Staff Public Information Officer at the Air Station, presented an illustrated talk—The Navy in Outer Space.

CDR Trator, Asst. Professor. The office of the Surgeon General has recently been notified of the appointment of CDR Anton A. Trator Jr, MC USN, currently on duty at the U.S. Naval Hospital, Oakland, Calif., as Assistant Clinical Professor of Physical Medicine at the University of California Medical Center.

Nursing Service Administration Workshop. This workshop was recently completed by 23 senior Navy Nurse Corps officers at the U.S. Naval Medical School, NNMC, Bethesda, Md. The workshop consisted of 5 days of intensive study of administrative subjects including staffing, motivation, evaluation, and progressive and intensive patient care. The session concluded the second year of short courses, institutes, and workshops conducted by the Nurse Corps Training Division of the Medical School. (PIO, NNMC)

LCDR Barkley Receives Medal. LCDR Lucien E. Barkley MSC USN, was recently presented the George Washington Honor Medal awarded by the Freedoms Foundation, Valley Forge, Pa.

The award for outstanding achievement in bringing about a better understanding of the American Way of Life was the result of a winning entry in the 1950 Letter Awards Program for Members of the Armed Forces, the subject of which was "My Vote: Freedom's Privilege." (TIO, BuMed)

Clinical Studies at NIH. Revised "Current Clinical Studies and Patient Referral Procedures" is available from the National Institutes of Health. Investigations by all component institutes—current or planned—are described; information is given on eligibility requirements, patient stay, and admittance procedures. Copies may be obtained from Director, NIH Clinical Center, Bethesda 14, Md. (Washington Report on the Medical Sciences, May 29, 1961)

Hepatitis Incidence. Morbidity and Mortality for 9 June 1961 (PHS, DHEW) reports a total of 1295 cases of hepatitis for the current week, representing a decrease of 316 cases from the previous week. The seasonal decline this year parallels that of 1954—the previous high year—although the number of cases reported weekly continues to exceed by 200 to 600 cases the number reported that year.

Treatment of Barbiturate Intoxication. Of 95 cases of barbiturate intoxication, 94 were managed without recourse to special stimulatory medicaments, but with meticulous attention to maintenance of blood pressure and a patent airway. One case was treated more strenuously with amphetamine. There was one death in the series, a mortality of 1.06%. (M. Ferguson and W. Grace, Ann Intern Med, April 1961)

DENTAL**SECTION**Dental Caries and Soil Constituents in New Zealand

M J Australia 2:227, 6 August 1960; abstr in Dental Abstracts 6:306-307, May 1961.

In 1955, Heat and Eastcott reported that a relationship existed between prevalence of caries and certain soil conditions in New Zealand. W. B. Helay, T. G. Ludwick, and Capt F. L. Losee DC USN, have been studying this matter and have presented a preliminary report.

One phase of the investigation involves study of the effect on the incidence of caries of recent saline soils in Napier, Hawkes Bay, which experienced extensive earthquakes in 1931. Five square miles of an extensive salt lagoon adjacent to the city have since been drained and used as a residential area.

In 1954 dental examinations were undertaken of children in Napier and in Hastings, a neighboring city whose water supply was to be fluoridated. Before fluoridation it was found that the Napier children, 5 to 8 years old, had a considerably lower incidence of caries than the children of equivalent age in Hastings. This was surprising because the two cities differ little in situation and population, and the water supply of the two cities comes from the same artesian strata. Examination of urine of the Napier children yielded

results that made it unlikely that they received extra fluorine from any source.

When the dental examinations were repeated in 1957, it was found that caries incidence in Hastings children had been reduced to approximately the same level as that in Napier.

Analysis of the soils from Napier and Hastings showed little difference, except that Hastings soils were acid whereas the Napier soils were alkaline and contained much more calcium. A large range of vegetables grown in the soils from the two cities was examined. In general, Napier vegetables contained more molybdenum, aluminum, and titanium than Hastings vegetables, and less copper, manganese, barium, and strontium.

Various investigators have suggested that molybdenum is of importance in tooth development. Molybdenum was present in only one Hastings vegetable, whereas it was present in nearly all Napier vegetables in amounts up to 9.5 ppm. It seems possible that the intake of molybdenum accounts for the lower incidence of caries in Napier before the water supply in Hastings was fluoridated.

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Histologic Effects of Silver Nitrate on Adult Pulp

Marvin B. Weiss, University of Illinois College of Dentistry, Chicago, Ill. J Indiana D A 39:294-299, Aug-Sept 1960; abstr in Dental Abstracts 6:263-264, May 1961.

Englander, James, and Massler (1958) showed that ammoniacal silver nitrate solution penetrated quickly and deeply through the carious dentin in the teeth of persons 17 to 21 years old, to produce severe injury of the pulp. The purpose of this study was to test the ability of silver nitrate to penetrate through the sound primary and secondary dentin in the teeth of subjects 40 to 66 years old, and to evaluate the effect of silver nitrate on the pulp.

Occlusal cavities were prepared in eight bicuspid teeth of the four subjects, all of whom were scheduled for full mouth extractions. A fresh solution of ammoniacal silver nitrate was applied to the floor of each cavity for ten minutes. The cavity was wiped clean and eugenol saturated on a cotton pellet was applied to the cavity floor for one minute. The cavity was then filled with a thick mix of zinc oxide-eugenol. One bicuspid was extracted after one hour and the others after

seven days. The teeth were sectioned, stained, and studied histologically.

In every specimen the silver nitrate had penetrated the primary dentinal tubules under the cavity almost to the pulp. The effects varied from slight disarrangement of the odontoblastic layer under shallow cavities, to total destruction of the odontoblasts under cavities of medium depth, to frank hemorrhage into the pulp and necrosis under deep cavities.

The defensive power of the pulp was remarkable. In a tooth in which the silver nitrate solution had penetrated through the dentinal tubules and deeply into the pulp tissue causing severe hemorrhage, in the seven days before the tooth was extracted, the damaged region had become walled off with normal pulp.

It is apparent that the use of silver nitrate on sound or carious dentin is not conducive to maintenance of a vital, healthy pulp.

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Personnel and Professional Notes

San Diego DOs at Meetings. In conjunction with the Southern California State Dental Association Meeting during April, many Navy dental officers of the San Diego area participated in a Military Symposium presided over by CAPT P. M. Carbiener DC USN, District Dental Officer of the 11th Naval District:

CAPT W. W. Crowe and LCDR R. W. Bagby—Oral Surgical Cases of Unusual

Interest.

CAPT E. B. Nutting—Endodontics.

CAPT J. A. Koch—Use of Electrosterilizer in Treatment of Hypersensitive Tooth Structure.

A Symposium on The Peripheries and Esthetics of Full Denture consisted of:

CAPT F. S. Wozniak and LT A. E. Krzeminski—The Posterior Palatal Seal.

LTs L. E. Mark and R. G. Lord—
The Periphery of Full Dentures.

LTs F. J. Miller and J. T. Howard—
Denture Staining Techniques.

A panel on Partial Dentures Compatible with the Periodontium was presented by:

CDR H. Halpern—Clasp Design.

LT M. M. Stevens—Reline and Delivery.

LTs E. S. Kozma and H. D. Burke—
Remount Procedures.

LT J. J. Lippert—Tooth Preparation.

LT C. E. Taggart—Palatal and Lingual Continuous Bars.

CAPT G. D. Richardson and LCDR E. H. Brown—The Effects of the Denture Bases Upon the Palatal Artery.

CAPT K. M. Broesamle—Improved Dental Color Photography.

The J. C. Metcalf Gold Foil Seminar of San Diego, also held in April, presented a panel on The Economics of Gold Foil consisting of CAPT E. R. Hildreth Jr, CDR C. A. DeLaurentis, and LTs Rolf G. Spamer and O. F. Herold.

Mass Casualty Treatment Demonstration. CAPTs T. R. Hamilton and J. C. Swearingen DC USN, assigned to the Naval Administrative Command, U.S. Naval Training Center, Great Lakes, Illinois, recently presented a Mass Casualty Treatment Demonstration before 750 members of the Wisconsin State Dental Society at the Milwaukee Municipal Auditorium.

Catalog of DT Schools and Courses. The Dental Division, Bu Med, has recently completed distribution to ships and stations having dental personnel the revised edition (March 1961) of the Catalog of Dental Technician Schools and Courses, NavMed

P-5029. This item also will be stocked at the Navy Supply Centers, Norfolk, Va., and Oakland, Calif.

PI Study Club Host to Civilian Societies. The Parris Island Dental Study Club was host during April to the Savannah Dental Society and the Coastal Dental Society. The feature of the meeting was a presentation by the guest lecturer, Dr. A. W. Sears of Jacksonville, Fla., one of America's leading authorities on Crown and Bridge Prosthesis. The speaker, presented by CAPT W. M. Fowler DC USN, Officer in Charge of the Dental Detachment, Marine Corps Recruit Depot, Parris Island, S. C., discussed The Use of Elastic Impression Materials in the Construction of Fixed Restorations.

CAPT Flocken Lectures Virginia DA. CAPT J. E. Flocken DC USN, U. S. Naval Dental School, NNMC, Bethesda, Md., presented two lectures—Modern Impression Techniques for Fixed Prosthodontics, and Understanding of Subgingival Impressions—before the Virginia State Dental Association at their annual meeting in Roanoke, Va., 30 April - 3 May.

Dr. Hayward Lectures at NDS. Dr. James R. Hayward, Professor of Oral Surgery at the University of Michigan School of Dentistry, recently discussed The Tongue in Health and Disease before staff, resident, and postgraduate dental officers, and civilian and military guests at the U. S. Naval Dental School. Dr. Hayward is Director of the Section of Oral Surgery of the University Hospital, and in addition to other affiliations, serves on the editorial board of the Journal of

Oral Surgery, Anesthesia, and Hospital Dental Service. The program was televised by closed circuit to other medical activities in the Washington, D. C. area.

CDR Counsell at Tufts Meeting. CDR L. A. Counsell DC USN on duty at the U. S. Naval Hospital, Chelsea, Mass., performed a class V gold foil procedure during the biannual meeting of the New England Study Club of Dentistry held at the Tufts University School of

Dental Medicine, 5-6 May. Dr. Jose Medina, Professor of Operative Dentistry, University of Maryland, was the Club Director.

LCDR Weber Presents Table Clinic. LCDR I. J. Weber Jr DC USN, U. S. Naval Dental Clinic, Pearl Harbor, Hawaii, presented a table clinic—Complete Denture Relief Areas—on 21 June 1961 before the Hawaii State Dental Association meeting at the Princess Kaiulani Hotel, Honolulu.

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Portable Resuscitator Cart

Much has been written and published recently concerning resuscitation methods and equipment in the dental

office. However, the oxygen cylinder and resuscitation equipment, in some instances, may not be stowed in the most accessible place or condition. CDR Benjamin F. Haymes DC USN, Oral Surgery Section, Dental Department, U. S. Naval Training Center, Bainbridge, Md., has developed an inexpensive (less than \$10.00) portable resuscitator.

A commercially available outboard motor carrier, sometimes referred to as a utility cart, can be easily modified (items A, B, C and D, Fig. 1) to accommodate a complete resuscitator unit. The cart is light in weight, easy to handle, and will facilitate the handling and transportation of the oxygen equipment in a most expeditious manner. When the cart and equipment are not in use they may be protected with a suitable cover and stationed in a centrally located area.

The oxygen unit suspended on the cart (Figs. 2 and 3) is available through the Federal Supply Catalog (FSN 6515-342-5200 Inhalator, Single).

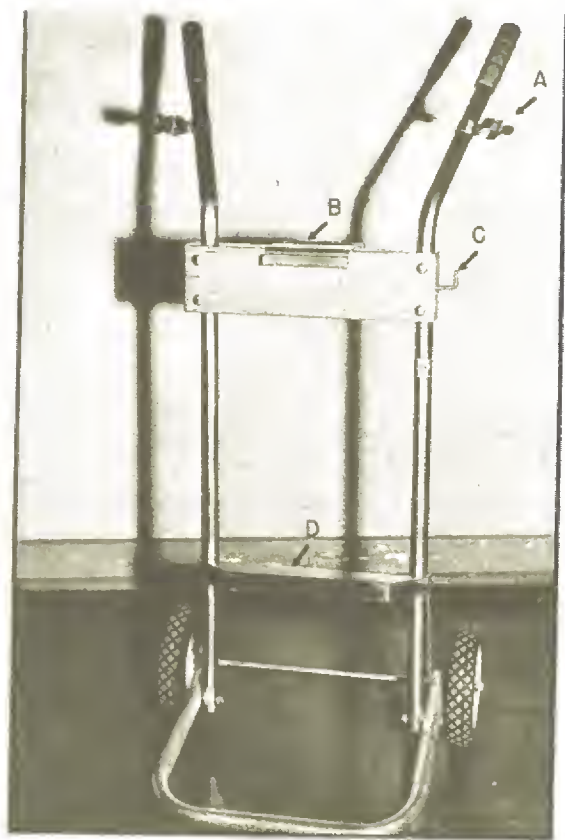


Fig. 1

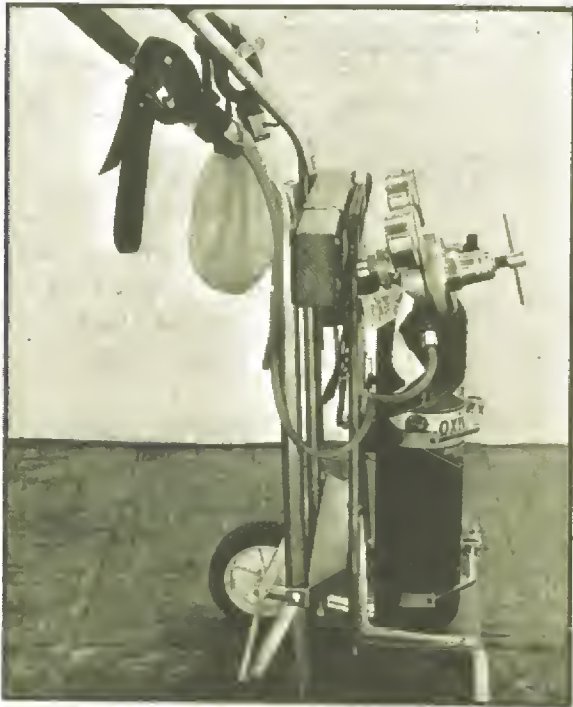


Fig. 2



Fig. 3

Activities desiring more detailed information concerning the conversion of the outboard motor carrier to that illustrated should address a request to the Bureau of Medicine and Surgery (Code 611).

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RESERVE



SECTION

Active Duty for Training (ACDUTRA)
During Fiscal Year 1962

The following courses—a continuation of the list begun in the News Letter for 2 June—are included in Active Duty for Training (ACDUTRA) authorized for fiscal year 1962. These courses are available to eligible inactive Medical Department personnel in pay and non-pay programs of the Naval Reserve. Assignment to active

duty for training is a matter within the cognizance of respective Naval District Commandants; interested Naval Reservists should apply to their commandants concerning any of the courses.

10. Amphibious Medical Indoctrination
Place: Naval Amphibious School, U.S. Naval Amphibious Base,

Little Creek, Norfolk, Va.

Dates: 14 August 1961; 12 February 1962

Description: Indoctrination of officers and enlisted personnel of the Reserve Medical Department in basic fundamentals of Amphibious Warfare and associated medical duties. By series of lectures, demonstrations, training aids, tours, and practical work, the student is introduced to Amphibious Warfare and medical problems that arise during an amphibious operation.

Eligibility: Naval Reserve Medical Department male officer and enlisted personnel. Quotas have been allocated to the 1st, 3rd, 4th, 5th, 6th, 8th, and 9th Naval Districts.

11. Amphibious Medical Indoctrination

Place: Naval Amphibious School, U. S. Naval Amphibious Base, Coronado, San Diego, Calif.

Date: Two-week course beginning any Monday morning.

Description: To familiarize officers and enlisted personnel of the Reserve Medical Department with techniques of casualty care and evacuation peculiar to amphibious operations, and preparation of plans therefor. This course covers amphibious operations in general and medical aspects thereof in particular. General background material is included to give students an appreciation of the complexities of the amphibious operation and the need for careful and thorough planning to handle medical problems that arise during such an operation.

Eligibility: Naval Reserve Medical Department male officer and enlisted personnel. Quotas have been allocated to the 9th, 11th, 12th, and 13th Naval Districts.

12. Disease Vector Control

Place: USN Disease Vector Control Center, U. S. Naval Air Station, Jacksonville, Fla.

Dates: 14 - 26 August 1961
9 - 21 October 1961
4 - 16 December 1961
5 - 17 February 1962
9 - 21 April 1962
18 - 30 June 1962

Disease Vector and Economic Pest Prevention and Control

Place: USN Disease Vector Control Center, U. S. Naval Air Station, Alameda, Calif.

Dates: 1st Monday of August, October, and December 1961 and February, April and June 1962.

Description: Series of lectures, demonstrations, and field exercises related to vector and pest control technology with special reference to naval preventive medical aspects. The role of insects, other arthropods, and rodents in the disease-vector reservoir host relationships is given careful consideration. Recognition, identification, biology and habits of the vectors in relation to prevention and control are stressed. Types, procurement, toxicity, safe use, proper choice, and application of pesticides are discussed. Recent advances and developments are part of the course curriculum.

Eligibility: Naval Reserve Medical Department officer and enlisted personnel and CEC officers. Quotas for Jacksonville, Fla. have been allocated to the 1st, 3rd, 4th, 5th, 6th, 8th, and 9th Naval Districts. Quotas for Alameda, Calif. have been allocated to the 11th, 12th, and 13th Naval Districts.

13. On-the-Job Training Hospital Corps

Place: Any suitable naval medical facility as may be determined by the cognizant commandant, preferably a naval hospital.

Eligibility: Naval Reserve enlisted personnel in, or in training for change in rating to, Group X. Personnel must have completed initial recruit training in accordance with current instructions. Quotas have been allocated to all naval districts (less 10, 14, 15, and 17).

14. Orientation to Field Medicine Practices

Place: Field Medical Service School, Marine Corps Base, Camp Lejeune, N. C.

Dates: 28 Aug - 9 Sept 1961
16 Oct - 28 Oct 1961
7 Dec - 19 Dec 1961

Description: An intensive course of instruction designed to provide Reserve Medical Department personnel orientation to duty in the field, at sea, and overseas with combatant units of the Fleet Marine Forces. It includes a brief outline of the organizations and functions of medical and dental departments of Fleet Marine Forces, preservation and survival under various combat and field situations, elements of preventive medicine, field sanitation and sanitary devices, combat casualty care, chain of evacuation, ABC warfare defense and decontamination, and principle considerations in mass casualty handling.

Eligibility: Naval Reserve Medical Department personnel, male only. Quotas have been allocated to the 1st, 3rd, 4th, 5th, 6th, 8th, and 9th Naval Districts.

15. Field Medicine

Place: Field Medical Service School, Marine Corps Base, Camp Pendleton, Calif.

Dates: 21 Aug - 1 Sept 1961
25 Sept - 6 Oct 1961
30 Oct - 10 Nov 1961
4 Dec - 15 Dec 1961
22 Jan - 2 Feb 1962
26 Feb - 9 Mar 1962
2 Apr - 13 Apr 1962
7 May - 18 May 1962
11 Jun - 22 Jun 1962

Description: Lectures, demonstrations and practical exercises to familiarize Reserve medical personnel with problems usually confronted and technics to be employed in application of field medicine. One week each is devoted to classroom and field work.

Eligibility: Naval Reserve Medical Department personnel, male only. Quotas have been allocated to the 9th, 11th, 12th, and 13th Naval Districts.

16. The following courses are not sponsored by the Bureau of Medicine and Surgery; however, Medical Department personnel are eligible to participate. Detailed information and reporting instructions are promulgated in BuPers Instruction 1571.4G. Copies of this instruction are available at all naval district headquarters and Naval Reserve training facilities.

On-the-Job Training MSTS Ships

NS Naval Justice, Newport, R. I.

National Security Seminars

Research Reserve Seminars

* * *

AVIATION MEDICINE DIVISION



Psychologic Factors in Space Travel

Henry A. Imus, Ph D, Assistant Director of Research, U. S. Naval School of Aviation Medicine, U. S. Naval Aviation Medical Center, Pensacola, Fla.

The key to successful completion of a manned vehicle flight, assuming that the reliability of the space cabin and its equipment is as high as the designers claim, lies in the motivation and competence of the astronauts selected for the journey. The history of exploration has shown repeatedly that strongly motivated men will accomplish difficult missions against almost overwhelming odds. Many examples could be mentioned of adventures in the Arctic, the Antarctic, the Atlantic and Pacific, and the balloon flights into the stratosphere.

Motivation and Morale. The significance of motivation has been investigated experimentally. For example, in a study of naval aviation cadets who were asked to volunteer for extra hazardous duty at Pensacola, Fla., it was found that the volunteers were superior to nonvolunteers in attitudes and performance in aviation training. In addition, among those who were dropped from aviation training at their own request, the nonvolunteers outnumbered the volunteers by a ratio of four to one.

Test pilots already have demonstrated strong motivation as well as aptitude, physiologic fitness, and psycho-

logic adaptability by their stability, good judgment under pressure, and competency to deal with the hazardous emergencies which are common occurrences in their daily routine of work. These factors were given special consideration in the selection of the Project Mercury Astronauts by the National Aeronautics and Space Administration. Each man volunteered twice, once for consideration and again for selection, following complete briefing and testing. They were free to decline further consideration without any adverse entry being made in their personnel record. During the time since selection, they have been able to maintain their flight proficiency in high performance aircraft in addition to becoming familiar with every phase of the projected mission and every aspect of the equipment. Not one has asked to be released.

The Astronaut's Personality. Although the tasks of the Astronauts in the actual missile and orbital flights may involve only reading instruments, recording observations, and certain decision-making functions, preparations for the flight necessitate that the Astronauts have high intelligence,

be able to interpret complex instruments, and have excellent appreciation of mathematic and spatial relations. Their drive and creativity should be strong, and they should be free from conflict and anxiety. They should not be overly dependent upon others, but should be able to accept such dependence when required for the success of the mission. They should be able to tolerate both close association with others and extreme isolation. Their motivation for space flight should demonstrate primary interest in the mission rather than in the satisfaction of exaggerated needs for personal accomplishment. Any indication of self-destructive wishes or over compensation for felt inadequacy would be undesirable. They should be prepared to take well-considered and deliberate action when necessary and be able to refrain from impulsive action when inactivity is appropriate. They must tolerate stress situations without requiring motor activity to dissipate anxiety.

Boredom and Fatigue. The principal effects of boredom and fatigue are carelessness and inefficiency in performance. In an intensive study of performance during confinement in a space cabin simulator at the Air Force School of Aviation Medicine volunteers monitored aircraft indicators for 30 consecutive hours. The task required that they take corrective action whenever the indicators departed from the zero position. During all this time there was no change in the physiologic functions of the volunteers. Their performance, on the other hand, was high for 15 hours, but then declined to 20-30% and showed an end spurt to only 50% of the original level. As a result of these

and other studies, it has been recommended that planned schedules of continuous diverse activity be arranged for the Astronauts in order that capacity to react promptly to emergency situations might be maintained.

That morale can be maintained and that boredom and fatigue can be eliminated was demonstrated quite effectively during the transpolar cruise of the submarine Nautilus. The well-known reliability of the power plant, the capability of the sonar gear to detect obstacles, the advanced equipment for navigation while submerged, and the closed circuit television which permitted visual observation of the ice formations and surface reconnaissance without breaking the seal contributed greatly to the confidence of the men in their safety while on the mission. An ideal environment was maintained, with temperatures ranging from 72° to 76°, humidity 40-50%, oxygen 20%, and carbon dioxide less than 1.5%. Emergency air breathing systems were available for immediate use in the event of equipment failure. The supply of fresh water was plentiful for drinking, bathing, and washing clothes. The food was unlimited and excellent in quality. Hi-fi music was played almost continuously, and reading and movies provided leisure entertainment. Planned schedules of games and tournaments appropriate for such close quarters were conducted and special incentive awards of liberty in England were the prizes. Friendly arguments, physical horseplay, and joking among the men relieved the tension.

Isolation and Sensory Deprivation. During extended flights in space, man will be physically, psychologically,

and emotionally separated from his long-accustomed environment. Such separation may affect his behavior and performance seriously. For example, pilots flying at very high altitudes have experienced for short periods a feeling of being isolated, detached, and physically separated from earth. This has been termed the "breakoff" phenomenon.

Sensory deprivation has been produced experimentally by reducing sensory input, using several procedures. One investigator submerged his subjects in a constant temperature water bath, while another placed frosted glasses on the eyes of recumbent subjects or plugs in their ears for a period of three days. A third used isolation chambers. In all cases the subjects experienced illusions and hallucinations, they were unable to think clearly, and suggestibility and irritability increased. The position and relationships of objects with the visual field would change, resulting in disorientation.

It is possible that the effects of isolation and sensory deprivation might be offset, in part, by habituation and conditioning prior to embarkation on a space flight. The most important aspect of isolation is the reduction of incoming information. It is believed that many of the effects of isolation could be counteracted by providing space crew members with ties to familiar customs and surroundings, thus duplicating the diversity of experience on earth. The limitations of the artificial environment, such as restriction of movement, knowledge that escape is impossible, and deprivation of communications may result in increased suggestibility and illusions. The personality, back-

ground, and motivation of each individual would influence his responses to such situations as well as greatly affect interpersonal relations with fellow crew members.

Anxiety. Uncertainty about the reliability of the space cabin and equipment, lack of knowledge about the course and progress of the flight, and anticipation of the hazard of re-entry are psychologic obstacles which may lead to anxiety on the part of the space crew. If adequate flight information is not provided by the control equipment of the space cabin or by the ground station in communications with it, or if corrective actions taken by the pilot in response to his instruments or to the ground station do not seem to have the desired effect upon the course of events, the pilot is subjected to considerable stress. Under severe stress, the individual's efficiency may decline rapidly. This could result in a vicious circle of increased anxiety accompanied by a still further decrease in efficiency. If this cycle persisted, one individual would tend to give away to resentment and projection of blame upon others. Another individual might fall into a state of depression, inertia, and apathy. As a result of unusual patterns of sensory input, such as disorientation and vertigo from zero G and tumbling, some might experience hallucinations or delusions. In all cases, continuing frustration would lead to a complete lack of appropriate response, irritability or apathy, and irrationality. Here, again, the personality and background of the individual would determine the kind of behavior.

Conclusion. Scientific data and first hand observation from balloon flights and from simulated space cabin flights have provided basic information

essential to the prediction of human performance in a manned vehicle missile and orbital flights. Motivation and morale may be controlled by extensive physiologic, psychologic, and psychiatric screening procedures. Boredom and fatigue may be controlled, in part, by scheduled activity appropriate to the mission. The effects of isolation may be reduced by adequate communication with ground stations encircling the earth.

Anxiety may be minimized by developing the cabin and equipment to such a condition of high reliability prior to launch that the Astronauts have complete confidence in their successful return and recovery. The selection of men who have demonstrated consistent and reliable performance in a variety of hazardous missions over a period of years provides the best guarantee of a successful mission into outer space.

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Aviation Sunglasses

Starting 1 July 1961, aviation prescription sunglass frames will be the USAF-USN-USA standard (FG-58; MIL-G-25948) with tint of neutral gray, 15% transmission. The standard Navy spectacle frames (S7) will be furnished with neutral gray lenses for non-aviation wear when justified by the prescribing officer. These

will be neutral gray, 15% transmission only. No other tints will be authorized for aviation sunglasses or standard Navy spectacle except when the power is too high to transmit satisfactory visual rays, in which case Calobar-C will be substituted. (Aviation Medicine Division, BuMed)

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Newer Methods of Artificial Resuscitation

CDR Robert E. Mitchell MC USN, U. S. Naval School of Aviation Medicine, U. S. Naval Aviation Medical Center, Pensacola, Fla.

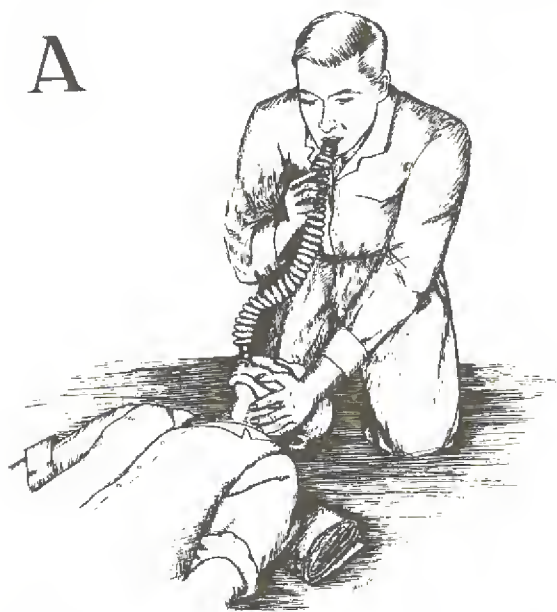
Various methods of resuscitation have been taught for many years (Schafer and others); however, none of these have been as effective as the mouth-to-mouth method. Though as old as the Bible (2 Kings 4:34), it has been only recently that this means of resuscitation has been used in everyday practice. More recently the mouth-to-mouth technic has been modified to the mouth-to-mask technic which is technically and esthetically

much more satisfactory. The adaptation to be discussed here was suggested by Dr. R.G. Bartlett, Jr., of the Naval School of Aviation Medicine at Pensacola, Fla.

A frustrating situation in any emergency is to have equipment which is malfunctioning or not functioning at all—particularly when it is a matter of life and death—or to have equipment which is too bulky to take into restricted areas. This holds true

especially in the matter of reviving a drowning or asphyxia victim.

Most aircraft carriers and air stations have a readily available piece of equipment, namely, the aviator's A13 oxygen mask, which is the solution to the above problem. This item is small enough to fit into any emergency kit, is extremely reliable, needs no modification, can be used anywhere,



and the oxygen/carbon dioxide mixture is physiologic. By placing the mask on the patient's face, holding the jaw up for a free airway, and breathing into the quick disconnect end of the tube, resuscitation can be carried on indefinitely. The valve mechanism of the mask is such that none of the patient's expired air enters the hose; it is thus esthetically acceptable. The mask can be used in a whaleboat, helicopter, or other places where bulkier types of resuscitators are not easily utilized. (See diagram A.)

It is considered that every ship or station with the mask available should be aware that this mask has a double

lifesaving potentiality—that of its intended use, and as a resuscitator. In fact, instead of surveying the old masks they should be distributed about the ship or station as a part of the first aid gear. A rubber airway can be kept with the mask for maximum benefit. All personnel should be trained in use of the resuscitator as a part of first aid training.

A second method of resuscitation which should be widely disseminated is that which has been developed by the group at Johns Hopkins Hospital. This is the technic of closed chest emergency heart massage when the heart has suddenly stopped beating (W. B. Kouwenhoven, et al, JAMA 173:1064, 1960). Certainly all medical officers should be familiar with this; but, even lay personnel can utilize it if necessary. It too should be a part of the first aid training.

The massage is carried out as follows:

The patient is placed in a supine position on the floor or other firm surface. Be certain that the airway is open. Kneel beside the patient and place the palms of the hands over the lower end of the sternum or breastbone. Press vertically downward, using the weight of the body to compress the sternum one to one and one-half inches. Next release the pressure, allowing the chest to expand. Repeat the cycle 60 to 80 times per minute. (See diagram B.)

At the same time that the massage is being given another person should be giving mouth-to-mouth or mouth-to-mask respiration.

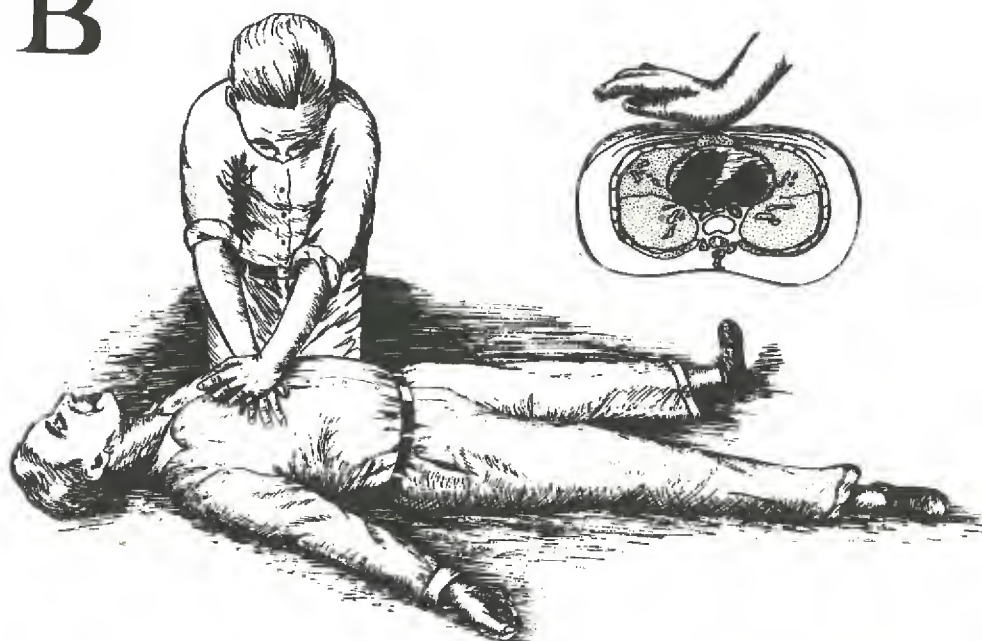
The above have been proven extremely effective and may mean the saving of a life in your hands—learn them!

The opinions and assertions contained herein are those of the author and are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

(Note: It is recognized that closed chest cardiac massage has not been unequivocally accepted. However, recent reports yield accumulating favor-

able evidence and increasing enthusiasm. In the event of cardiac arrest, it must be pointed out that following initial emergency procedures undelayed definitive treatment by a physician is to be accomplished in a hospital where equipment is available for diagnosing and defibrillating the heart in the event ventricular fibrillation develops. —Editor)

B



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Use Limits for Concentrations of Minor Constituents in Liquid Oxygen for Aviator's Breathing

The Medical News Letter of 21 April 1961 carried an article on liquid oxygen (LOX) contamination. Some test results by the Naval Air Test Center at Patuxent River, Maryland, are reported below. These reveal the concentrations of minor constituents in LOX during the use cycle.

The amount of minor constituents in LOX is well below their toxic levels

when the liquid is procured originally by the Navy. However, concentration of these constituents is increased by transfer and storage. The purpose of this investigation was to obtain information on the exact amount of build-up of these contaminants in LOX storage tanks, transfer trailers, and aircraft LOX converters. This information was required by BuWeps to assist in

establishment of maximum allowable limits of contamination.

The LOX storage facility at NAS Patuxent River utilized a 5250 gallon liquid vacuum insulated storage tank, manufactured by Linde Air Products. Fifty gallon transfer trailers in use on the station were manufactured by either Herrick L. Johnson, Henry Spen Company, or Ronan and Kunzl, Incorporated. Aircraft LOX converters from which the samples were drawn were manufactured either by the Aero Equipment Corporation or by the Pioneer Central Division of the Bendix Aviation Corporation, and were installed in FJ-4B, F8U-2/2N, and F9F-8T airplanes. The period of test extended from 1 March to 9 March 1961.

LOX samples were drawn from these sources utilizing a locally developed sampler that trapped and vaporized a liquid sample in an especially prepared G-276 oxygen cylinder.

Samples of LOX were taken from the vendor's LOX transport truck, the local storage tank, five 50-gallon servicing trailers, and 10 aircraft LOX converters. Oxygen samples were analyzed on a Beckman IR-4 Infrared Spectrophotometer, utilizing a 10-meter cell.

Only one storage tank was in use at this activity during the period of these tests. Five truckloads of LOX totaling 11,725 gallons had been transferred into this tank since it was returned to service after a complete overhaul and purge. Each of these loads of LOX had been sampled and the sample analyzed on the infrared spectrophotometer. The only contaminants detected were methane (CH₄), which varied from 7.0 parts

per million (ppm) to 11.6 ppm, and carbon dioxide (CO₂), which varied from 2.2 ppm to 5.1 ppm. These concentrations were well below the allowable limits of 20.0 ppm of CO₂ and 25.0 ppm of CH₄ set forth in the purchase specification of military specification MIL-0-21749, Amendment 1 of 10 April 1959.

During these tests three samples were taken from the storage tank. Analyses of these samples indicated that the only contaminants detected were CH₄, which varied from 11.7 ppm to 15.8 ppm, and CO₂, which varied from 1.6 ppm to 4.2 ppm. These concentrations were well below the allowable limits of 40 ppm for both CH₄ and CO₂ set forth in BuWeps ltr Aer-AE-42/101 of 11 August 1959. The CH₄ concentration was approximately twice the amount in the LOX when it was delivered by the vendor.

Eight samples of LOX were taken from 50-gallon transfer trailers and 14 from aircraft LOX converters. The only contaminants detected were CH₄ and CO₂. In the 50-gallon transfer trailers the concentration of CH₄ varied from 12.0 ppm to 24.2 ppm, and the concentration of CO₂ varied from 1.5 ppm to 5.4 ppm. The CH₄ concentration was approximately three times the amount in the LOX when it was delivered by the vendor. The concentration of CH₄ in the aircraft converters varied from 24.5 to 56.0 ppm, while the concentration of CO₂ varied from 1.2 ppm to 3.7 ppm. The CH₄ concentration was approximately 5 times the amount in the LOX when it was delivered by the vendor. No limits have been established for concentrations of contaminants allowable in transfer trailers and aircraft converter

systems.

During the period of these tests there was no report by pilots or air crew men of any odors in the airplane oxygen systems or any untoward effects from breathing any of the oxygen dispensed at this activity.

As a result of these and other tests, the Bureau of Naval Weapons issued a speedletter on LOX use limits. The following use limits were recommended as analytic guidelines for LOX samples taken from equipment at various points in the cycle:

a. Supplier's storage or delivery tank - Maximum allowable concentrations of minor constituents as specified in Table I of Military Specification MIL-0-21749A(Aer)-1

b. Air station or aircraft carrier storage tanks - Two to one increase over MIL-0-21749A(Aer)-1 maximum allowable concentrations

c. Aircraft servicing equipment (filler carts, etc.) - Three to one increase over MIL-0-21749A(Aer)-1 maximum allowable concentrations

d. Aircraft converters - Five to one increase over MIL-0-21749A(Aer)-1 maximum allowable concentrations

The above use limits are based on information concerning normal storage and transfer evaporation losses, safe established physiologic limits, and odor incident probability. For (b), (c) and (d) above, it is considered that increases by factors of 2, 2, and 3 respectively, in lieu of 2, 3, and 5 would be more desirable. However, analytic data on LOX samples from aircraft converters indicate the factors 2, 3, and 5 to be more realistic and within the realm of present equipment and operating capabilities. This is particularly shown by avail-

able analysis of LOX samples taken from aircraft carrier equipment.

The use limit of five times the specification allowable concentrations, which is recommended in (d) above for the aircraft converter, is well below established physiologic limits as safe maximum allowable concentrations for prolonged exposure.

Due to extreme sensitivity of the nose, substances in LOX may produce odor when they are usually not determinable; thus, it is possible that a quantity of LOX which does not exceed use limits as determined by analytic tests may produce odors. Odors may develop by slow evaporation of LOX over a prolonged period and by addition of new LOX. Also, constituents may not be evenly distributed and may be concentrated in discrete frozen crystals. Thus, a sample could pass the analytic tests and smell tests, but in use have a temporary odor when the crystals change to the gaseous state.

In view of the complex odor problem, these use limits should not be used to extend the time for draining and flushing LOX storage tanks, transfer carts, and aircraft converters. The usual minimal periodic flushing and purging schedules should be continued as recommended by BuWeps Aviation Clothing and Survival Equipment Bulletins Nos. 39-59 and 39-59A. If analytic tests reveal that use limits are being exceeded at any point in the cycle, more rigid controls and more frequent draining and flushing will be necessary.

A BuWeps Aviation Clothing and Survival Equipment Bulletin on this subject is in preparation.

Jet Noise Suppression Program

As early as May 1955 the Bureau of Naval Weapons initiated programs to investigate noise suppression, including portable ground noise suppressors. This was extended in 1958 to include noise level surveys of all current Navy jet engines. In 1959 and 1960 the Bureau of Naval Weapons supported work at Curtiss-Wright for the evaluation of a noise suppressor. In June 1959, General Electric was awarded a contract to continue experimental testing and research to determine the basic fundamentals of noise generation. As a result a procedure has been developed making it possible to predict noise reduction capabilities of various suppressors applicable to subsonic non-afterburner

cases. New work to include supersonic and afterburner operation is in progress. These studies are emphasizing the rear section of the planes inasmuch as that is the most critical noise level area as far as medical damage to personnel aboard carriers and in small operating areas is concerned. It is anticipated that additional effort will be required in the areas of jet engine noise suppression. Acceptable noise levels aboard ships (bridge, communications system, sleeping quarters, et cetera) will be established. The end result of the testing will be efficient suppressors that are more economical and with less loss of thrust.

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